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International application number: PCT/AU04/001677

International filing date: 26 November 2004 (26.11.2004)

Document type: Certified copy of priority document

Document details: Country/Office: AU
Number: 2004904384
Filing date: 04 August 2004 (04.08.2004)

Date of receipt at the International Bureau: 22 December 2004 (22.12.2004)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

PCT/AU2004/001677

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I, LEANNE MYNOTT, MANAGER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2004904384 for a patent by RAZORBACK VEHICLES CORPORATION LIMITED as filed on 04 August 2004.

WITNESS my hand this
Fourteenth day of December 2004

LEANNE MYNOTT
MANAGER EXAMINATION SUPPORT AND SALES

S&F Ref: 686524

AUSTRALIA

Patents Act 1990

PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:

A pneumatic or hydraulic cylinder

Name and Address of Applicant:

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Name of Inventor:

Jeffrey Kendall

This invention is best described in the following statement:

A PNEUMATIC OR HYDRAULIC CYLINDER

Technical Field

The present invention relates to pneumatic and hydraulic cylinders and more particularly but not exclusively to hydraulic cylinders employed in motor vehicles such as that described in International Patent Applications PCT/AU01/00446, PCT/AU00/01235, PCT/AU00/00234, PCT/AU00/00065, WO 98/07591 and WO 91/14076.

Background of the Invention

Particularly described in International Patent Application PCT/AU01/00446 is a hydraulic cylinder employed in a vehicle to raise and lower the load receiving tray thereof.

In vehicles that have a load receiving tray that is moved between a raised (transport position) and a lower position facilitating the loading and unloading of materials, the tray needs to be fixed in the raised position. The cylinder of International Patent Application PCT/AU01/0046 has the object of providing a hydraulic cylinder operable to secure the tray in the raised position.

Although there is known a variety of hydraulic or pneumatic cylinders that are lockable, they frequently are expensive to manufacture and may not be reliable.

Object of the Invention

It is the object of the present invention to overcome or substantially ameliorate at least one of the above disadvantages.

Summary of the Invention

There is disclosed herein a pneumatic or hydraulic cylinder having a longitudinal axis and to be activated by a fluid under pressure, the cylinder including:

a barrel having a bore;

a piston rod slidably and sealingly located in the bore and co-operating therewith to provide a variable volume chamber into which the fluid under pressure is delivered to move the piston rod to change said volume;

a port in communication with said chamber and via which the fluid is allowed to pass;

a lock assembly mounted on the piston rod, the assembly including:

at least one lock member movable relative to said axis between a radially inner position permitting movement of the piston rod, and a radially outer position engaging the

barrel to prevent movement of the piston rod in a predetermined direction beyond a predetermined longitudinal position;

a retaining member mounted on the piston rod and movable longitudinally relative thereto between a first position retaining the lock member in the radially outer position, and a second position providing for movement of the lock member to the radially inner position;

means to urge the retaining member to the first position thereof to thereby urge said locking member to the radially outer position; and

wherein said retaining member when in said first position and exposed to the fluid under pressure is moved to the second position thereof to allow movement of the lock member to the radially inner position to free said piston rod for movement in said direction.

Preferably, the retaining member is moved to the second position by fluid under pressure in said chamber.

Preferably, said retaining member is a sleeve surrounding the piston rod, said sleeve having a longitudinally extending portion which, when said retaining member is in the first position, is radially aligned with said lock member, thus retaining the lock member in the radially outer position.

Preferably, said lock member is spherical in configuration.

Preferably, said lock member is a first lock member, and said cylinder includes further lock members, all the lock members being spherical in configuration with the same diameter, the lock members being angularly displaced about said axis.

Preferably, said bore includes an annular ramp surface joining a first bore length to a second bore length, the first bore length having a greater radius than the second bore length, with said lock member/s engaging the first bore length to be located in the radially outer position, and engaging the second bore length to be located in the radially inner position.

Preferably, the means to urge is a spring extending between said retaining member and piston rod.

Preferably, the surface of the means to urge is a surface of the retaining member.

Preferably, said cylinder includes a cage member providing a plurality of apertures extending radially with respect to said axis, each aperture receiving a respective one of the locking members.

Preferably, said cage member is provided with a cage portion and said retaining member is slidably mounted in said cage member.

Preferably, said cage member includes a chamber within which said retaining member is slidably mounted, with the cage member chamber receiving the fluid under pressure to cause longitudinal movement of the retaining member to the first position thereof.

Preferably, said retaining member has a ramp surface to engage the lock member/s to cause radial movement thereof to the radially outer portion.

Preferably, said chamber is a first chamber, and said cylinder includes a second chamber which is sealing separated from the first chamber.

Preferably, fluid under pressure delivering to said first chamber causes movement of the piston rod in said predetermined direction while if delivered to said second chamber causes the piston rod to move in a direction opposite to said predetermined direction.

Preferably, said retaining member moves in said predetermined direction relative to said piston rod when moving from the first position to the second position.

Preferably, the cylinder includes a rod chamber that moves with the piston rod and wherein said retaining member is slidably received said rod chamber and receives the fluid under pressure to move said retaining member to the first position thereof.

Brief Description of the Drawings

A preferred form of the present invention will now be described by way of example with reference to the accompanying drawings wherein:

Figure 1 is a schematic sectioned side elevation of a hydraulic or pneumatic cylinder;

Figure 2 is a further schematic sectioned side elevation of the cylinder of Figure 1; and

Figure 3 is a schematic sectioned side elevation of a modification of the cylinder of Figures 1 and 2.

Detailed Description of the Preferred Embodiments

In Figures 1 and 2 of the accompanying drawings there is schematically depicted a hydraulic or pneumatic cylinder 10. The cylinder 10 includes a barrel 11 providing a generally cylindrical bore 12. The bore 12 slidably receives a piston rod 13 and sealingly engages the piston rod 13 to provide a variable volume chamber 14 which receives a fluid under pressure. The fluid under pressure enters and leaves the chamber 14 via the port 15. The port 15 is formed in an end cap 16 of the barrel 11, which cap 16 sealingly closes the chamber 14.

The cylinder 10 has a longitudinal axis 17, with piston 13 moving longitudinally of the barrel 11 to change the volume of the chamber 14.

The barrel 11 may have at its other end a further end cap so that a second variable volume chamber 18 is provided, the chamber 18 having associated with it a port 19. Again the chamber 18 would receive a fluid under pressure if so required. Attached to the piston rod 13 is a wear band 19 and seal 20 that sealingly connects the piston rod 13 with the bore 12. The wear band 19 by having apertures also allows fluid to pass between the chambers 18 and 34.

The end cap 16 is provided with an annular skirt 21 that provides a first bore length 22 joined to a second bore length 23 by a ramp surface 24. The ramp surface 24 diminishes in radius from the length 22 to the length 23, as the length 22 has a greater radius than the length 23.

Mounted on the piston rod 13 is a lock assembly 25 that is operable to retain the piston rod 13 in the retracted position, that is in the position shown in Figure. 2. When operated the lock assembly 25 prevents movement of the piston rod 13, to increase the volume of the chamber 14, beyond a predetermined position, the position being defined by the ramp surface 24.

The lock assembly 25 includes one or more spherical lock members 26 that are equal in diameter and located at angularly spaced locations about the axis 17. The members 26 are movable radially between an inner radial position (as shown in Figure 1) and an outer radial position (as shown in Figure 2). When in the inner position the members 26 permit movement of the piston rod 13, while in the radially outer position the members 26 prevent movement of the piston rod 13 beyond the position shown in Figure 2.

Slidably mounted on the piston rod 13 is a retainer member 27 in the form of a sleeve. The member 27 has an annular portion 28 of predetermined longitudinal length that when radially aligned with the members 26 maintains the members 26 in the radially outer position. When the portion 28 is displaced from the members 26 (as shown in Figure 2) the members are permitted to move radially inward.

The members 26 are captively located with respect to the rod 13 by means of an end flange 29.

A spring 30 is located in the chamber 34 and extends between the member 27 and a further end flange 31 of the rod 13, to urge the member 27 to the position as shown in Figure 2, that is the position at which the member 27 is retaining the members 26 in the

radially outer position. Accordingly the spring 30, via the members 27 also urges the member 26 to the radially outer position.

In operation of the above described cylinder 10 the piston rod 13 when moved in the direction of the arrow 32 by a force applied thereto, such as a fluid under pressure being delivered to the chamber 18, progresses towards the end cap 16 with the members 26 in the radially inner position. Ultimately, the members 26 engage the ramp surface 24 and move radially outward. Thereafter the retaining member 27 is moved in the direction of the arrow 32 relative to the piston rod 13 under the action of the spring 30. Fluid under pressure passing the wear band 19 and entering the chamber 34 aids in moving the retaining member 27 relative to the rod 13 in the direction of the arrow 32. This movement of the member 27 moves the members 26 radially outward once they pass the ramp surface 24. The piston rod 13 is therefore locked in a position of Figure 2 as movement of the piston rod 13 in the direction of the arrow 33 is prevented by engagement of the members 26 with the ramp surface 24 and engagement of the flange 29 with the members 26. However, upon fluid under pressure being delivered to the chamber 14 (with the piston rod 13 in the position shown in Figure 2), the fluid under pressure moves the member 27 in the direction of the arrow 33 relative to the piston rod 13. This results in the portion 28 moving from a position between the members 26 and the piston rod 13 so that the members 26 can move radially inward, thereby permitting movement of the piston rod 13.

In Figure 3 there is schematically depicted a modification of the hydraulic or pneumatic cylinder 10 of Figures 1 and 2.

In this embodiment there is attached to the rod 13 a cage member 36 providing a passage 35 for the flow of hydraulic fluid under pressure to a rod chamber 37 that moves with the rod 13. In this embodiment the chamber 37 is provided by the cage member 36. Slidably received in the chamber 37 is a retaining member 38 having a conical ramp surface 39 engaged with the spherical lock members 26.

The cage member 36 has an annular cage portion 40 with angularly spaced generally circular apertures 41. The apertures 41 are spaced angularly about the longitudinal axis 17 and receive the members 26 to provide for radial movement of the members 26 relative to the axis 17.

Connecting the retaining member 38 with an internal bore 42 of the cage member 36 is a seal 43 while connecting the cage member 36 with the second bore length 23 is a seal 44.

In operation of the hydraulic cylinder 10 of Figure 3, when hydraulic fluid under pressure is delivered to the chamber 18 the piston rod 13 is driven in the direction of the arrow 32. When the members 26 move past the ramp surface 24 they move radially outward under the influence of the ramp surface 39. In particular, hydraulic fluid under pressure is delivered to the chamber 37 through the passage 35 to cause the retaining member 38 to move in the direction of the arrow 32 relative to the cage member 36. The fluid under pressure bears against surface 45 of the retaining member 38 to urge the retaining member 38 to move relative to the cage member 36. This relative movement causes the conical ramp surface 38 to move the members 26 radially outward past the ramp surface 24 to engage the first bore length 22. Once in this configuration, movement of the piston rod 13 in a direction opposite the arrow 32 is prevented by engagement of the members 26 with the surface 24. However upon hydraulic fluid under pressure being delivered to the chamber 14 through the port 15, the hydraulic fluid under pressure bears against the retaining member 38 and causes it to move in a direction opposite the arrow 32 relative to the cage member 36 to thereby permit radially inward movement of a members 26. Once the members 26 clear the ramp surface 34, pressure on the cage member 36 and retaining member 38 causes the piston rod 13 to move in a direction opposite the direction of the arrow 32.

Dated 4 August, 2004
Razorback Vehicles Corporation Limited
Patent Attorneys for the Applicant/Nominated Person
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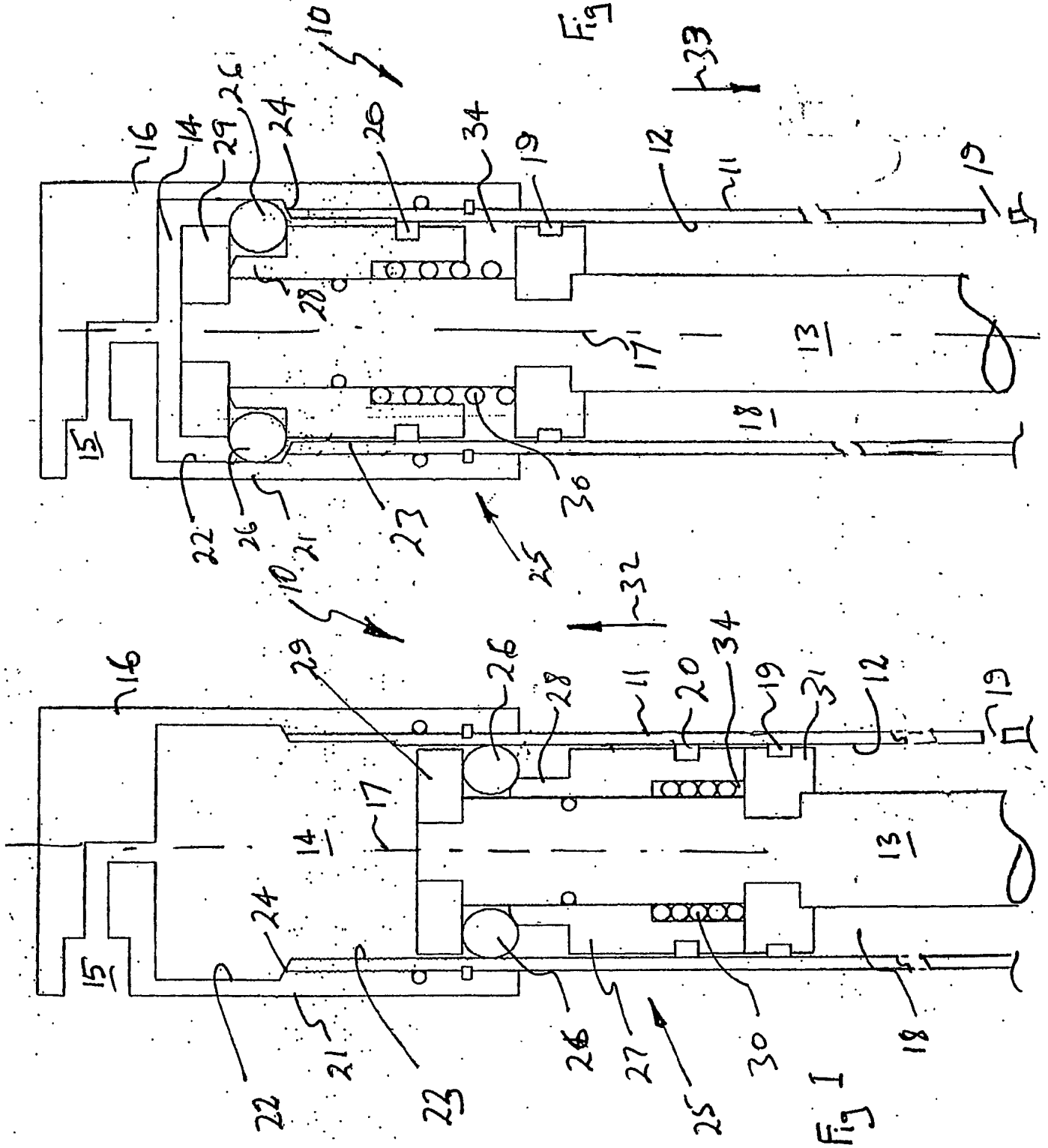
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Fig 1

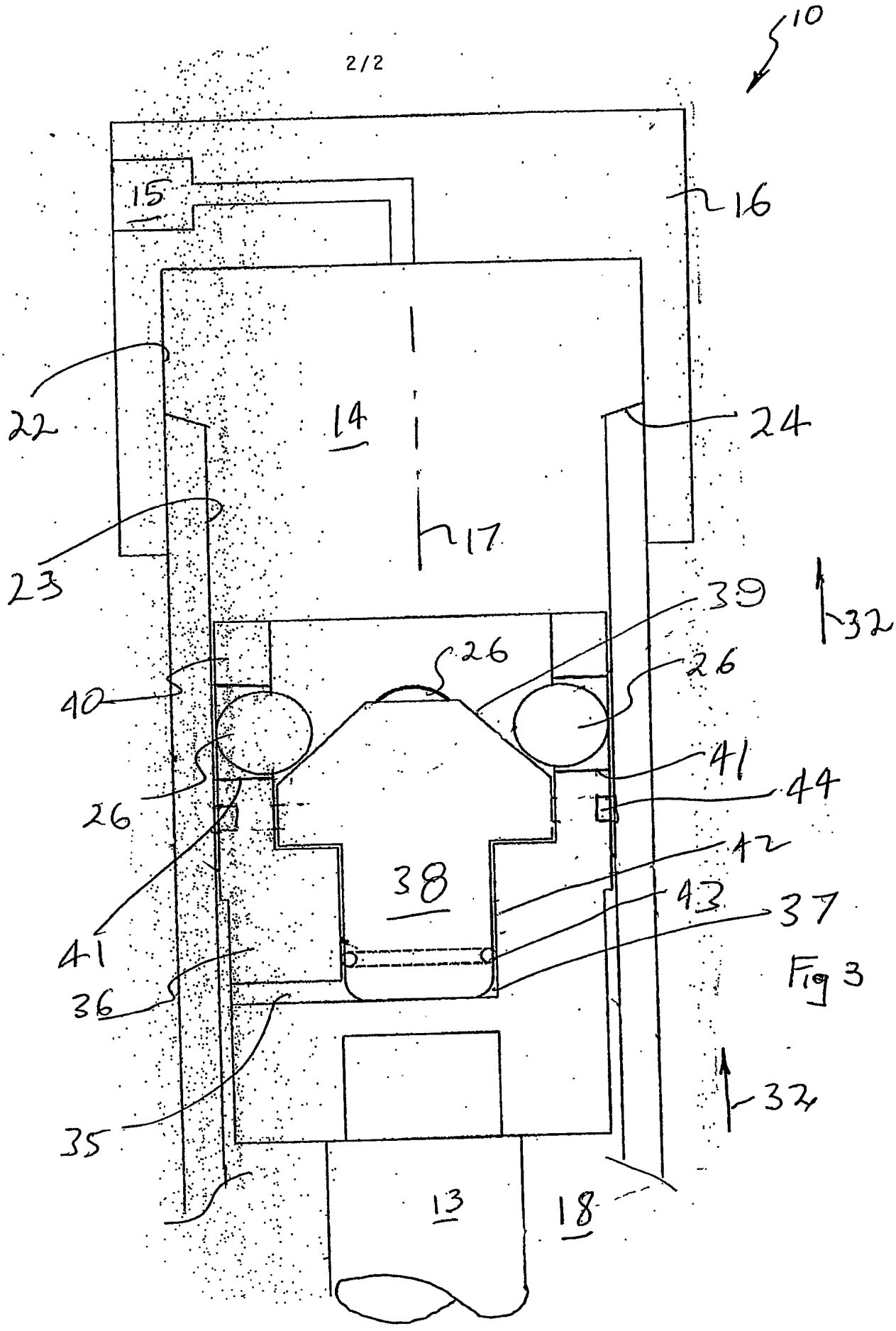
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Fig 3